Application No.: 10/632,499
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Reply to Office Action of January 10, 2007

Amendments to the Specification

Please replace paragraph [0025] with the following amended paragraph:

[0025] This is not, however to be construed as a limitation of the invention. It is sufficiently clear to one skilled in the art that the invention can also be carried out with conventional microscopes with digital image production. Illuminating light beam 3 coming from at least one illumination system 1 is directed by a beam splitter or a suitable deflection means 5 to a scanning module 7. Before illuminating light beam 3 strikes deflection means 5, it passes through an illumination pinhole 6. Scanning module 7 comprises a gimbal-mounted scanning mirror 9 that guides illuminating light beam 3 through a scanning optical system 12 and a microscope objective 13, over or through a subject 15. In the case of nontransparent subjects 15, illuminating light beam 3 is guided over the subject surface. With biological subjects 15 (preparations) or transparent subjects, illuminating light beam 3 can also be guided through subject 15. For that purpose, non-luminous preparations are optionally prepared with a suitable dye (not depicted, since established existing art). The dyes present in the subject are excited by illuminating light beam 3 and emit light in a characteristic spectral region peculiar to them. This light proceeding from subject 15 defines a detected light beam 17. The latter travels through microscope optical system 13 and scanning optical system 12 and via scanning module 7 to deflection means 5, passes through the latter and arrives, through a detection pinhole 18, at at least one detector unit 19, which is equipped in the exemplary embodiment depicted here with at least one photomultiplier as detector. It is clear to one skilled in the art that other detectors, for example diodes, diode arrays, photomultiplier arrays, CCD chips, or CMOS image sensors, can also be used. Detected light beam 17 proceeding from or defined by subject 15 is depicted in FIG. 1 as a dashed line. In detector 19, electrical detected signals proportional to the power level of the light proceeding from subject 15 are generated. Since, as already mentioned above, light of more than one wavelength is emitted from subject 15, it is useful to insert in front of detector unit 19 a selection means ~~21~~ for the spectrum proceeding from the sample. The data generated by detector unit 19 are forwarded to a computer system 23. At least one

peripheral unit 27 is associated with computer system 23. The peripheral unit can be, for example, a display on which the user receives instructions for adjusting the scanning microscope and can also view the present setup and also the image data in graphical form. Also associated with computer system 23 is an input means comprising, for example, a keyboard 28, an adjusting apparatus 29 for the components of the microscope system, and a mouse 30.

Please replace paragraph [0027] with the following amended paragraph:

[0027] FIG. 3 shows the observation of living and movable subjects 40 and the processing of data obtained from the observation of living and movable subjects 40. For the observation of living and movable subjects 40, several images or image frames 41_1, 41_2, 41_3, . . . , 41_n are acquired consecutively, for example using scanning microscope 100 described in FIG. 1, each image frame 41_1, 41_2, 41_3, . . . , 41_n defining an XY plane or an acquired specimen volume XYZ. Between each two successive images, e.g. 41_1, 41_2 or 41_2, 41_3, or 41_{n-1}, 41_n, a respective displacement vector field 42_1, 42_2, . . . , 42_{n-1} is determined. The displacement vector field between two successive images, e.g. 41_2 and 41_3, can be determined from a comparison of the individual mutually corresponding pixels of the two images. Proceeding from a first image 41_1 having N pixels, it is thus possible to ascertain the new positions in the next image ~~42_2~~ 41_2 by way of the displacement. An even more accurate model can also be fitted for a trajectory 43, with sub-pixel accuracy, from the discrete displacements. Advantageously, more than one successive image is then used for this accuracy-enhancing operation. Trajectory 43 for the movable subject is obtained from the plurality of displacement vector fields 42_1, 42_2, . . . , 42_{n-1} by tracking the displacement vector fields of the individual images 41_1, 41_2, 41_3, . . . , 41_n. In the graphical depiction of trajectory 43, the moving subjects are represented by at least one trajectory through XYt space 44.